

NAVAL SURFACE WARFARE CENTER - DAHLGREN DIVISION



# *Q* Electromagnetic & Sensor Systems Department



## SATELLITE COMMUNICATIONS AND THE AFLOAT ELECTROMAGNETIC COMPATIBILITY ANALYSIS PROGRAM (AESOP)

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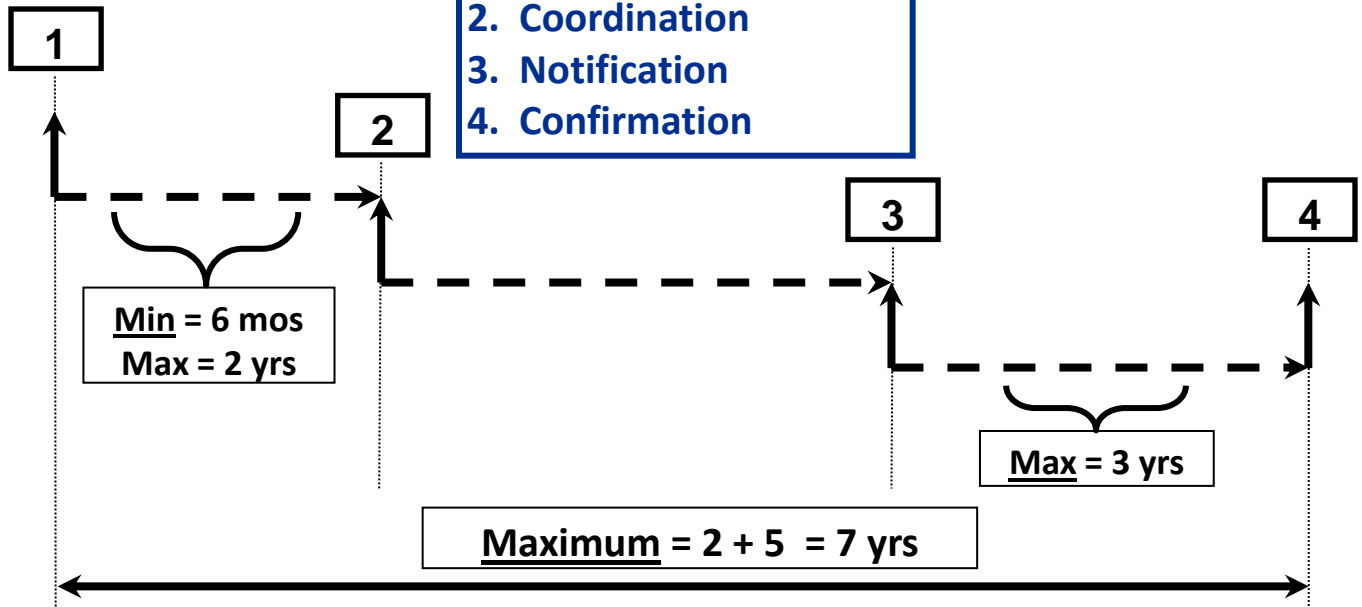
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# Satellite Registration Process 4 Phases / 7 Years

## ITU Registration Process

1. Advance Publication
2. Coordination
3. Notification
4. Confirmation



Satellite Program  
Decision

Requirements

Launch

DoD Acquisition Process

CDD

Specs

SOW

PPBS

Contract

PDR

CDR

Test

### Acronyms:

CDD: Capability Description Document

SOW: Statement of Work

PPBS: Plans, Programs, Budget System

PDR: Preliminary Design Review

CDR: Critical Design Review



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# Satellite Frequencies and the OPTASK COMM

- **Satellite Access Requests (SAR)**
  - Request to obtain uplink/downlink frequencies for Defense Satellite Communication System (DSCS), Commercial Wideband Satellite Program (CWSP), Commercial Broadband Satellite Program (CBSP), Extremely High Frequency (EHF)
- **Satellite Access Assignment (SAA)**
  - Provides satellite uplink/downlink frequencies for DSCS, CWSP, CBSP, EHF
- **SATCOM Frequencies in the OPTASK COMM**
  - UHF SATCOM frequencies are provided by the NCTAMS in the daily status message (2301Z)
  - SHF/EHF frequencies are provided to the ship(s) directly from the Regional Satellite Support Center (RSSC) via SAA.
  - OPTASK COMM Satellite Line Numbers are used to account for satellite frequencies.
  - Satellite frequencies documented in the OPTASK COMM will be analyzed by AESOP software for Electromagnetic Interference (EMI).





# Satellite Frequencies and Radar Assignments



**Radar Planner and Communications Planners work together**

- **Must share information to support Information Warfare (IW) and Command, Control, Communications and Computers (C4)**
- **Supports IW requirements, deny spectrum from our enemies while providing rapid and reliable communications**



**Communications planner distributes OPTASK COMM to Radar Planner**

- **Radar Planner imports OPTASK COMM into AESOP prior to generating Radar Assignments**
- **AESOP generates Radar assignments to minimize EMI to communications systems from Radar & Electronic Warfare (EW) systems**



# Satellite Frequencies and AESOP EMI Analysis

**RONALD REAGAN EMI Victims**

Select an EMI Victim

Victim	Priority	Frequency MHz	JRFL
SPS-48E(V)10	Neutral	2939.00 - 3058.00	
SPS-49A(V)1	Neutral	881.33 - 910.22	
SPS-67(V)1	Neutral	5781.00	
SPS-73(V)17	Neutral	9405.00	
UPX-27 INTERROGATOR	Neutral	1090.00	
UPX-27 TRANSPONDER	Neutral	1030.00	
USC-38 NO. 1 (ST802B)	Neutral	20700.00	
VHF BRIDGE-TO-BRIDGE NO. 1 (LP158)	Neutral	156.80	
WSC-6 NO. 1 (ST800B)	Neutral	7710.00	
WSC-8 NO. 1 (ST801B)	Neutral	3744.00	

Sources of EMI to Selected Victim

Platform	Source	EMI Level	Frequency (MHz)
No EMI Predicted.			

OK  
Report  
Help

Cumulative EMI  
Level:  
Severe  
Moderate  
Mild  
Score:  
0

## Example EMI Victims Dialog



# Satellite Recap

- **Satellite Frequencies and the OPTASK COMM**
  - **Add SATCOM frequencies to the OPTASK COMM to avoid EMI from high powered radar systems to co-located satellite systems operating in the same bands**
  - **Improve reliability to critical satellite links such as DSCS, CWSP**
- **Satellite Frequencies and Radar Assignment Generation**
  - **Consider OPTASK COMM frequencies during AESOP's EMI analysis**
  - **Provide radar frequency plan that minimizes EMI to satellite and terrestrial communications nets and links**
- **AESOP Software Demo**

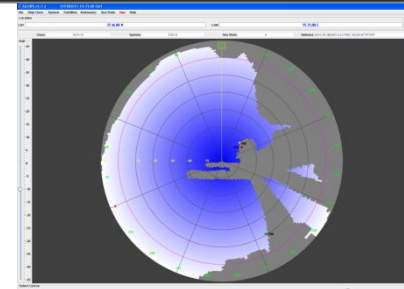




# AESOP Core Elements

## ➤ Build/Gather/Input Deployment Data

- Phases/Areas of Operations
- Participants
- Net Plans



## ➤ Request Spectrum Management Data

- Equipment Inventory
- Frequencies

## ➤ Receive/Input Spectrum Management Data

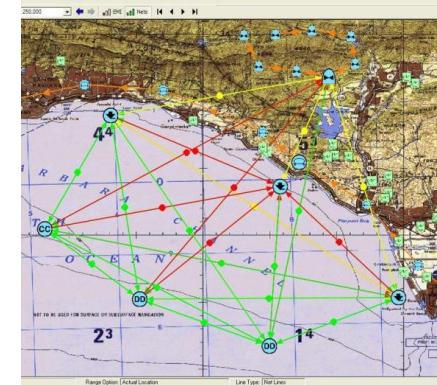
- Import of Equipment Inventory
- Import of Frequency Assignments

## ➤ Create/Distribute Frequency Plan

- OPTASK COMM, Radar Assignments, SFAF

## ➤ Monitor Spectrum Usage

- Identify EMI/Connectivity Issues





# DEMO

- Demo is built using the Instructional Use Unclassified database with default FY2011 Reagan Strike Group (SG)
- Sample Local Area Frequency Assignment is included
- Demonstration will show that by including SATCOM uplinks and downlinks in the Net Plan, potential EMI issues from shipboard radar systems can quickly be identified and mitigated
- AESOP strives to avoid EMI to any terrestrial and/or SATCOM frequencies in Net Plan when regenerating new Radar Assignments



# Questions?

# Comments?



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# BACKUP SLIDES

- Phases of Satellite Registration Process:
  - API
  - CRC
  - Notification
  - Confirmation



# Phase 1: Advance Public Information (API)

- Administration Submits API to International Telecommunications Union (ITU)
  - 2 to 7 Years Prior Planned Launch/Operational
  - General Information / Identity of the Network
- ITU
  - Reviews API for Completeness
  - Distributes to Its Members
- ITU Members
  - Review API; Identify and Provide Initial (Interference) Concern/s to Filing/Registration Administration



# Phase 2: Satellite Coordination Request (CRC)

- Administration Submits CRC to ITU
  - Between 6 Months to 2 Years after submitting API
  - Detail Identity of the Network
    - Specific Frequency Band(s) , Orbital Slot, Planned Operational Date,
    - Transponder RF Characteristics (Power, Bandwidth, Antenna Gain/Pattern)
    - Associated Earth Station and Service Area
- ITU
  - Reviews CRC for Completeness/Conformance
  - Distributes to Its Members





# Phase 2 (Continued): CRC

## ➤ ITU Members

- Review CRC; Provide Specific Interference Concern/s to Filing/Registration Administration
  - Based on Frequency Overlapping, Closed Orbital Separations, Co-Located Service of filing Networks

## ➤ Filing/Registration Administration

- Contacts Concerned Administration to initiate Coordination

## ➤ Coordination

- Administration - Administration, or Operator - Operator
- Long Process (Negotiations)
- **End Result:** Eliminated/Minimized Potential for RF Interferences between Networks and Obtained Agreements from Affected/Concerned Administrations



# Phase 3: Notification & Phase 4: Confirmation

- Phase 3: Notification to ITU
  - Provide Status of Completed Coordination/Obtained Agreements With All Affected/Concerned Administrations
- Phase 4: Confirmation
  - Launched Satellite – Within 7 years of API Date
  - Send Confirmation (Satellite On-Orbit)
  - Established “Date of Bringing Into Use” -- Operational Date --
- If Didn't Launch Satellite within the 7 Years Filing Period
  - ITU Cancels Filing
  - Re-file (Go Back to Phase 1)
  - Lost Priority